SCHEDULE 1

PART 3

Boundary values for biological quality elements

Boundary values for aquatic plants and animals in rivers

1. The Department must apply, as applicable, to any river or part thereof, the "high", "good", "moderate", "poor" or "bad" benthic invertebrate fauna boundary value for rivers specified in Tables 1 and 2 below.

2. The Department must apply, as applicable, to any river or part thereof, the "high", "good", "moderate", "poor" or "bad" phytobenthos boundary value for rivers specified in Table 3 below.

3. The Department must apply, as applicable, to any river or part thereof, the "high", "good", "moderate", "poor" or "bad" aquatic macrophyte boundary value for rivers specified in Table 4 below.

4. The Department must apply, as applicable, to any river or part thereof, the "high", "good", "poor" or "bad" freshwater fish boundary value for rivers specified in Table 5 below.

Boundary values for aquatic plants and animals in lakes

5. To determine the phytoplankton and phytobenthos boundaries to apply to a lake or any part thereof, the Department must assign to that lake or any part thereof, the appropriate geological category, depth category and colour category specified in Schedule 1 Part 1, Tables 5, 6 and 7 respectively.

6. The Department must apply, as applicable, to any lake or part thereof, the "high", "good", "moderate", "poor" or "bad" phytoplankton boundary values for lakes specified in columns 2, 3, 4, 5 and 6 of Table 6 below and columns 2, 3, 4, 5 and 6 of Table 7 below and columns 2 and 3 of Table 8 below respectively.

7. The Department must apply, as applicable, to any lake or part thereof, the "high", "good", "moderate", "poor" or "bad" phytobenthos boundary value for lakes specified in Table 9 below.

8. The Department must apply, as applicable, to any lake or part thereof, the "high", "good", "moderate", "poor" or "bad" aquatic macrophyte boundary value for lakes specified in Table 10 below.

9. The Department must apply, as applicable, to any lake or part thereof, the "high", "good", "moderate", "poor" or "bad" freshwater fish boundary value for lakes specified in Table 11 below.

Boundary values for aquatic plants and animals in transitional and coastal waters

10. The Department must apply, as applicable, to any transitional water, coastal water or part thereof, the "high", "good", "moderate", "poor" or "bad" benthic invertebrate fauna boundary values for transitional and coastal waters specified in Tables 12 and 13 below.

11. The Department must apply, as applicable, to any transitional water, coastal water or part thereof, the "high", "good", "moderate", "poor" or "bad" aquatic angiosperm boundary value for transitional and coastal waters specified in Table 14 below.

12. The Department must apply, as applicable, to any transitional water, coastal water or part thereof, the "high", "good", "moderate", "poor" or "bad" phytoplankton boundary value for transitional and coastal waters specified in Table 15 below.

13. The Department must apply, as applicable, to any transitional water, coastal water or part thereof, the "high", "good", "moderate", "poor" or "bad" aquatic macroalgae boundary values for transitional and coastal waters specified in Tables 16 and 17 below.

14. The Department must apply, as applicable, to any transitional water or part thereof, the "high", "good", "moderate", "poor" or "bad" fish boundary value for transitional waters specified in Table 18 below.

Table 1

Benthic invertebrate fauna Walley Hawkes Paisley Trigg (WHPT) boundary values (WHPT Average Score per Taxon) for rivers

Boundary values for the degree to which the annual mean sensitivity to disturbance of the observed taxa differs from the annual mean sensitivity of the taxa expected under reference conditions	
	Ecological quality ratio
High	0.97
Good	0.86
Moderate	0.72
Poor	0.59
Bad	< 0.59

Table 2

Benthic invertebrate fauna Walley Hawkes Paisley Trigg (WHPT) boundary values (WHPT Number of TAXA) for rivers

Boundary values for the degree to which the annual mean number of disturbance-sensitive taxa differs from the annual mean number of taxa expected under reference conditions	
	Ecological quality ratio
High	0.80
Good	0.68
Moderate	0.56
Poor	0.47
Bad	< 0.47

Table 3

Phytobenthos (Diatom) boundary values for rivers

Boundary values for the degree to which the relative annual mean abundances of nutrient-sensitive and nutrient-tolerant groups of diatom taxa differ from the relative annual mean abundances of these groups of taxa expected under reference conditions	
	Ecological quality ratio

Boundary values for the degree to which the relative annual mean abundances of nutrient-sensitive and nutrient-tolerant groups of diatom taxa differ from the relative annual mean abundances of these groups of taxa expected under reference conditions	
High	0.80
Good	0.60
Moderate	0.40
Poor	0.20
Bad	< 0.20

Table 4

Macrophyte boundary values for rivers

Boundary values for the degree to which the annual mean abundances of disturbance-sensitive and disturbance-tolerant macrophyte taxa differ from the annual mean abundances of those taxa under reference conditions	
	Ecological quality ratio
High	0.80
Good	0.60
Moderate	0.40
Poor	0.20
Bad	< 0.20

Table 5

Freshwater Fish FCS2 (Ireland) boundary values for rivers

	Ecological quality ratio[1]
High	0.845 < EQR<= 1.0
Good	0.54 < EQR <= 0.854
Moderate	0.12 < EQR <= 0.54
Poor	0.007 < EQR <= 0.12
Bad	0 <= EQR <= 0.007

(1) FCS2 (Ireland) is the Fisheries Classification Scheme 2 (Ireland) model developed for WFD Ecoregion 17 which is the island of Ireland

Table 6

Phytoplankton boundary values for lakes – chlorophyll a

Boundary values for the degree to which the biomass of phytoplankton taxa (as represented by the annual mean chlorophyll a concentration) differ from the biomass of those phytoplankton taxa (annual mean chlorophyll a concentration) expected under reference conditions					
Ecological quality ratio					
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Lake Type	High alkalinity, shallow Marl shallow	High alkalinity, very shallow Moderate alkalinity, very shallow Low alkalinity, very shallow Marl very shallow	Moderate alkalinity, deep Moderate alkalinity, shallow Moderate alkalinity shallow humic	Low alkalinity, shallow Low alkalinity, shallow humic	Low alkalinity deep
High	0.55	0.63	0.50	0.64	0.64
Good	0.32	0.30	0.33	0.29	0.33
Moderate	0.16	0.15	0.17	0.15	0.17
Poor	0.05	0.05	0.05	0.05	0.05
Bad	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Table 7

Phytoplankton boundary values for lakes – plankton trophic index

Ecological quality ratio					
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Lake Type	High alkalinity, shallow Moderate alkalinity very shallow Low alkalinity very shallow humic Marl very shallow	High alkalinity very shallow	Moderate alkalinity, deep Moderate alkalinity shallow Low alkalinity, shallow humic Low alkalinity very shallow Clear	Low alkalinity Deep Clear Water Low alkalinity shallow Clear Water	Low alkalinity shallow humic

Ecological quality ratio				
		Marl Shallow		
High	0.93	0.91	0.95	0.98	0.96
Good	0.82	0.80	0.84	0.87	0.85
Moderate	0.70	0.68	0.72	0.75	0.73
Poor	0.58	0.56	0.60	0.63	0.61
Bad	<0.58	<0.56	<0.60	<0.63	<0.61

Table 8

Phytoplankton boundary values for lakes – cyanobacteria biomass

Ecological quality ratio		
Column 1	Column 2	Column 3
Lake Type	All Low and Moderate alkalinity and Marl Lakes	High alkalinity Lakes
High	0.47	0.63
Good	0.32	0.43
Moderate	0.23	0.34
Poor	0.13	0.21
Bad	< 0.13	< 0.21

Table 9

Phytobenthos boundary values for lakes

Boundary values for the degree to which the relative annual mean abundances of nutrient-sensitive and nutrient-tolerant groups of diatom taxa differ from the relative annual mean abundances of these groups of taxa expected under reference conditions		
Ecological quality ratio		
Column 1	Column 2	Column 3
	High and Low alkalinity lakes	Moderate alkalinity lakes
High	0.92	0.93
Good	0.70	0.66
Moderate	0.46	0.46
Poor	0.23	0.23
Bad	< 0.23	< 0.23

Table 10

Aquatic macrophyte boundary values for lakes

Boundary values for the degree to which the annual mean abundance of disturbance-sensitive macrophyte[1] taxa differ from the annual mean abundance of those taxa expected under reference conditions	
	Ecological quality ratio
Column 1	Column 2
High	0.90
Good	0.68
Moderate	0.42
Poor	0.33
Bad	< 0.33

(1) The term "macrophyte" refers to larger plants, typically including flowering plants, mosses and larger algae, but not including single-celled phytoplankton or diatoms.

Table 11

Freshwater Fish FiL2 boundary values for lakes

	Ecological quality ratio[1]
High	0.76 < EQR<= 1.0
Good	0.53 < EQR <= 0.76
Moderate	0.32 < EQR <= 0.53
Poor/Bad	0 <= EQR <= 0.32

(1) FiL2 is the Fish in Lakes version 2 model developed for WFD Ecoregion 17 which is the island of Ireland

Table 12

Benthic invertebrate fauna boundary values for IMPOSEX in coastal waters

Boundary values for the degree to which the annual mean occurrence and degree of tributyl tin (TBT) -induced imposex in the common dog whelk, Nucella lapillus, differs from the annual mean occurrence and degree of imposex expected under reference conditions using the Vas Deferens Stage Index (VDSI) (UKTAG Method ISBN 978-1-906934-35-4)		
	Ecological quality ratio	Vas Deferens Stage Index (VDSI)
High	0.95	0.3
Good	0.33	4
Moderate	0.17	5

Table 13

**Benthic invertebrate fauna boundary values for the INFAUNAL
Quality Index (IQI) for transitional and coastal waters**

Boundary values relating to the degree to which the annual mean number of benthic invertebrate taxa in soft sediments, the diversity of taxa, and the ratio of disturbance-sensitive and disturbance-tolerant taxa differ from that expected under reference conditions (UKTAG Method ISBN 978-1-906934-34-7)	
	Ecological quality ratio
High	0.75
Good	0.64
Moderate	0.44
Poor	0.24
Bad	< 0.24

Table 14

Aquatic angiosperm boundary values in transitional and coastal waters

Aquatic Angiosperm[1] Boundary values relating to the degree to which the annual mean shoot density, and spatial extent of sea grass beds, differ that expected under reference conditions (UKTAG Method ISBN 978-1-906934-36-1)	
	Ecological quality ratio
High	0.8
Good	0.6
Moderate	0.4
Poor	0.2
Bad	< 0.2

(1) The term "angiosperm" refers to flowering plants. In transitional waters and coastal waters, angiosperms include sea grasses and the flowering plants found in salt marshes, salt marsh tools have not yet been developed.

Table 15

Phytoplankton boundary values for transitional and coastal waters

Boundary values relating to the degree to which biomass, taxonomic composition, bloom frequency and bloom intensity for phytoplankton[1] differ from that expected under reference conditions (UKTAG Method ISBN 978-1-906934-41-5 for Transitional waters and UKTAG method ISBN 978-1-906934-33-0 for Coastal Waters)	
	Ecological quality ratio
High	0.8

(1) The term "phytoplankton" refers to solitary and colonial unicellular algae and cyanobacteria that live in the water column, at least for part of their lifecycle.

Boundary values relating to the degree to which biomass, taxonomic composition, bloom frequency and bloom intensity for phytoplankton[1] differ from that expected under reference conditions (UKTAG Method ISBN 978-1-906934-41-5 for Transitional waters and UKTAG method ISBN 978-1-906934-33-0 for Coastal Waters)	
Good	0.6
Moderate	0.4
Poor	0.2
Bad	< 0.2

(1) The term "phytoplankton" refers to solitary and colonial unicellular algae and cyanobacteria that live in the water column, at least for part of their lifecycle.

Table 16

Aquatic macroalgae boundary values in transitional and coastal waters

Boundary values relating to the degree to which mean species richness, proportion of red, green and opportunist seaweeds and ecological status group ratio on rocky intertidal areas differ from that expected under reference conditions (UKTAG Method ISBN 978-1-906934-39-2)	
	Ecological quality ratio
High	0.8
Good	0.6
Moderate	0.4
Poor	0.2
Bad	< 0.2

Table 17

Aquatic macroalgae boundary values in transitional and coastal waters

Boundary values relating to the degree to which opportunistic macroalgal[1] extent, biomass and entrainment differ from that expected under reference conditions (UKTAG Method ISBN978-1-906934-37-8)	
	Ecological quality ratio
High	0.8
Good	0.6
Moderate	0.4
Poor	0.2
Bad	< 0.2

(1) The term "macroalgae" refers to multicellular algae such as seaweeds and filamentous algae.

Table 18

Fish boundary values for transitional waters

Boundary values relating to the degree to which transitional water fish communities deviate from expectations in terms of species diversity and composition, species abundance, estuarine utilisation, and trophic composition using the Estuarine Multi-metric Fish Index (EMFI)	
	Ecological quality ratio
High	≥ 0.92
Good	0.65
Moderate	0.35
Poor	0.10
Bad	< 0.10